



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Pioneer Hi-Bred International, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (T. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN

'PHT05'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 29th day of July in the year of our Lord one thousand nine hundred and ninety-four.

Attest

Kenneth A. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Mike Essy
Secretary of Agriculture



Public reporting burden for this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington, DC 20503, Department of Management and Budget, Paperwork Project Room (2050-2050).

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions on reverse)

1. NAME OF APPLICANT (as it is known to the Commission)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.	3. VARIETY NAME
PIONEER HI-BRED INTERNATIONAL, INC.			PHDTS
4. ADDRESS (street and no. or R.F.D. no., city, state, and ZIP)		5. PHONE (include area code)	FOR OFFICIAL USE ONLY
Research and Product Development Division P. O. Box 85 Johnston, IA 50131-0085		515/270-3300	9400095
6. GENUS AND SPECIES NAME	7. FAMILY NAME (Botanical)	8. DATE OF DETERMINATION	
Zea Mays	Gramineae	March 20, 1990	
9. CROP KIND NAME (Common Name)		10. IF THE APPLICANT NAME IS NOT A PERSON, GIVE FORM OF ORGANIZATION (Corporation, Partnership, Association, etc.)	
Corn	Corporation		11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Iowa		12. DATE OF INCORPORATION	
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE, IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS		13. DATE OF INCORPORATION	
Dr. Bruce D. McBratney Research and Product Development Division Pioneer Hi-Bred International, Inc. P.O. Box 85, Johnston, IA 50131-0085		May 6, 1996	
14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)			
<input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety. <input checked="" type="checkbox"/> Exhibit B. Novelty Statement. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety. <input checked="" type="checkbox"/> Exhibit D. Additional Description of Variety. <input checked="" type="checkbox"/> Exhibit E. Statement of the Status of Applicant's Ownership. <input checked="" type="checkbox"/> Seed Sample (0.500 viable untreated seeds. One Seed Sample mailed to Plant Variety Protection Office <u>1-31-94</u> <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,100) made payable to "Treasury of the United States."			
15. DOES THE APPLICANT SPECIFY THAT SEEDS OF THIS VARIETY BE SOLD BY VARIETY NAME OR AS A CLASS OF CERTIFIED SEED? (See section 62(a) of the Plant Variety Protection Act.)			
<input type="checkbox"/> YES or "YES" answer does 16 and 17 below <input checked="" type="checkbox"/> NO or "YES" stop at item 18 below			
16. DOES THE APPLICANT SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?			
<input type="checkbox"/> YES <input type="checkbox"/> NO			
17. IF "YES" TO ITEM 16, WHICH CLASSING OF PRODUCTION BEYOND BREEDER SEED?			
<input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED			
18. DID THE APPLICANT PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?			
<input checked="" type="checkbox"/> YES or "YES" through <input type="checkbox"/> Plant Variety Protection Act <input type="checkbox"/> Patent Act. Give date: _____			
19. HAS THE VARIETY BEEN RELEASED, UNDER OFFENSE FOR SALE, OR MARKETING IN THE U.S. OR OTHER COUNTRY?			
<input checked="" type="checkbox"/> YES or "YES" Give names of countries and dates: _____			
20. I, the undersigned, do hereby declare that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request. I also declare that the variety is new, distinct, and stable, and is worthy of protection under the provisions of section 42 of the Plant Variety Protection Act.			
Applicant is hereby informed that false representation herein may constitute perjury and result in penalties.			
SIGNATURE OF APPLICANT (Printed Name)		CAPACITY OF TITLE	DATE
PIONEER HI-BRED INTERNATIONAL, INC.			
SIGNATURE OF APPLICANT (Printed Name)		CAPACITY OF TITLE	DATE
Bruce D. McBratney		Technical Support Coord.	January 31, 1994

14A. Exhibit A. Origin and Breeding History

Pedigree: PHH93/PHR25)X742X

Pioneer Line PHTD5, Zea mays L., a yellow tann inbred, was developed by Pioneer Hi-Bred International, Inc. from the single cross PHH93 x PHR25 using the pedigree method of breeding. The progenitors of PHTD5 are proprietary inbred lines of Pioneer Hi-Bred International, Inc. Selfing and selection were practiced within the above F1 cross for 2 generations in the development of PHTD5 at Glyndon, MN. During line development, crosses were made to inbred testers for the purpose of estimating the line's combining ability. Yield trials were grown at Glyndon, MN, as well as other Pioneer research stations. After initial testing, additional hybrid combinations have been evaluated and subsequent generations of the line have been grown and hand-pollinated with observations made for uniformity.

PHTD5 has shown uniformity and stability for all traits as described in Exhibit C - "Objective Description of Variety". It has been self-pollinated and ear-rowed 2 generations with careful attention paid to uniformity of plant type to assure genetic homozygosity and phenotypic stability. The line has been increased both by hand and in isolated fields with continued observations for uniformity.

No variant traits have been observed or are expected in PHTD5.

The criteria used in selection of PHTD5 were yield, both per se and in hybrid combinations; kernel size, especially important in production; ability to germinate in adverse conditions; number of tillers, especially important in production because having numerous tillers increases hybrid production costs spent on detasseling; disease and insect resistance; pollen yield; tassel size; pollen shed duration.

DEVELOPMENTAL HISTORY FOR PHTD5

<u>SEASON/YEAR</u>	<u>INBREEDING LEVEL</u>
Summer 1984	F0
Summer 1985	F1
Summer 1986	F2
Summer 1987	F3*
Summer 1988	F4
Summer 1989	F5**

*PHTD5 was selfed and selected through F3 generation.

**PHTD5 was selfed and ear-rowed F3 and F5 generations.

14B. Exhibit B. Novelty Statement

PHTD5 is similar to the Pioneer Hi-Bred International, Inc. proprietary inbred line PHR25 (PVP Certificate No. 8800002). PHTD5 has a slight tendency to develop two ears per stalk whereas PHR25 develops only one ear per stalk. PHTD5 has dark green leaves, PHR25 has medium green leaves. PHTD5 has few longitudinal leaf creases whereas they are absent on PHR25. PHTD5 has red anthers compared to PHR25 which has purple anthers. PHTD5 has straight, indistinct kernel rows but PHR25 has straight, distinct kernel rows.

PHTD5 has higher yield, grain harvest moisture and test weight than PHR25. PHTD5 has better seedling vigor and higher early stand count than PHR25. PHTD5 flowers (GDU Shed and GDU Silk) later than PHR25. PHTD5 has better grain appearance than PHR25.

EXHIBIT NO. C

VARIETY DESCRIPTION INFORMATION

INBRED = PHTD5

Type: Dent

Region Best Adapted: North Central

A. Maturity: Average across maturity zones. Zone : 0

Heat Unit Shed: 1230
Heat Unit Silk: 1250
No. Reps: 23

HEAT UNITS = $\frac{[\text{Max. Temp. } (< 86^{\circ}\text{F.}) + \text{Min. Temp } (> 50^{\circ}\text{F.})] *}{2}$ - 50

* If maximum is greater than 86 degrees fahrenheit, then 86 is used and if minimum is less than 50, then 50 is used. Heat units accumulated daily and can not be less than 0.

B. Plant Characteristics:

Plant height (to tassel tip): 184 cm
Length of top ear internode: 12 cm
Number of ears per stalk: Slight two ear tendency
Ear height (to base of top ear): 92 cm
Number of tillers: None
Cytoplasm type: Normal

C. Leaf:

Color: (B14) Dark Green
Angle from Stalk: 30-60 degrees
Marginal Waves: (WF9) Few
Number of Leaves (mature plants): 19
Sheath Pubescence: (W22) Light
Longitudinal Creases: (OH56A) Few
Length (Ear node leaf): 67 cm
Width (widest point, ear node leaf): 9 cm

D. Tassel:

Number lateral branches: 15
Branch Angle from central spike: 30-40 degrees
Pollen Shed: Light based on Pollen Yield Test
(88% of experiment means)
Peduncle Length (top leaf to basal branches): 12 cm
Anther Color: Red
Glume Color: Green

E. Ear (Husked Ear Data Except When Stated Otherwise):

Length: 13 cm
Weight: 104 gm
Mid-point Diameter: 41 mm
Silk Color: Salmon
Husk Extension (Harvest stage): Medium (barely covering ear)
Husk Leaf: Short (< 8 cm)
Taper of Ear: Average
Position of Shank (dry husks): Upright
Kernel Rows: Straight Indistinct Number = 16
Husk Color (fresh): Light Green
Husk Color (dry): Buff
Shank Length: 13 cm
Shank (No. of internodes): 8

F. Kernel (Dried):

Size (from ear mid-point)
 Length: 11 mm
 Width: 8 mm
 Thick: 5 mm
 Shape Grade (% rounds): 40-60 (45% medium round based on Parent Test Data)
 Pericarp Color: Colorless
 Aleurone Color: Homozygous Yellow
 Endosperm Color: Yellow
 Endosperm Type: Normal Starch
 Gm Wt/100 Seeds (unshelled): 28 cm

G. Cob:

Diameter at mid-point: 22 mm
Strength: Strong
Color: Red

H. Diseases:

N. Leaf Blight (E. turcicum): Intermediate
 Common Rust (P. sorghii): Resistant
 Stewart's Wilt (E. stewartii): Intermediate
 Common Smut (U. maydis): Highly Resistant
 Head Smut (S. zeicola): Intermediate
 Fusarium Ear Mold (F. moniliforme): Highly Resistant
 Gibberella Ear Rot (G. zeae): Intermediate

I. Insects:

European Corn Borer-1 Leaf Damage (Pre-flowering): Susceptible
 European Corn Borer-2 (Post-flowering): Intermediate

The above descriptions are based on a scale of 1-9, 1 being highly susceptible, 9 being highly resistant.

S (Susceptible): Would generally represent a score of 1-3.
 I (Intermediate): Would generally represent a score of 4-5.
 R (Resistant): Would generally represent a score of 6-7.
 H (Highly Resistant): Would generally represent a score of 8-9. Highly resistant does not imply the inbred is immune.

J. Variety Most Closely Resembling:

Character	Inbred
Maturity	PHR25
Usage	PHR25

PHR25 (FVP Certificate No. 8800002) is a Pioneer Hi-Bred International, Inc. proprietary inbred.

Data for Items B, C, D, E, F, and G is based primarily on a maximum of two reps from Johnston, Iowa grown in 1992, plus description information from the maintaining station.

CLARIFICATION OF DATA IN EXHIBITS C AND D

Please note the data presented in Exhibit C, "Objective Description of Variety," is data collected primarily at Johnston, Iowa plus description information from the maintaining station. The data in Exhibit D, "Additional Description of Variety," is data from comparisons of inbreds or hybrids grown in the same tests in the adapted growing area of PHTD5.

$$* = 10\% \text{ SIG} \quad + = 5\% \text{ SIG} \quad \# = 1\% \text{ SIG}$$

YEAR	VAR		BU	BU	NET	FST	WAR	STG	EST	DRP	CUU	CUU	GNV	STA	STK	RT	BRT
	#	ABS	ACK	ACK	WT	WT	FLT	WR	QNT	PAR	STG	STG	APP	APP	ABS	ABS	ABS
91	1	67.2	110	19.3	58.5	98.2	5.3	44.1	99.7	1211	1204	6.0	6.5	94.5	95.2	99.4	
	2	58.4	97	18.8	55.9	95.5	5.2	47.4	99.8	1173	1195	3.7	2.0	97.7	98.9	98.2	
	LOCs	9	9	9	4	3	18	6	16	13	5	1	6	4	2	2	
	REPS	20	20	20	6	4	28	14	22	16	12	2	14	10	4		
	PROB	.032+.057+	.150	.0004	.224	.840	.043+	.363	.000#	.291	.041+				.189	.187	.146
92	1	78.5	113	16.5	59.5	99.3	5.1	36.6		1220	1237	4.0	2.1	96.9		100.0	
	2	79.0	114	16.5	57.0	99.0	4.7	34.4		1175	1207	4.0	1.8	91.4		100.0	
	LOCs	3	3	3	3	6	10	27		27	26	1	4	3		1	
	REPS	18	18	18	18	12	20	64		34	30	1	9	13		1	
	PROB	.930	.862	.964	.132	.831	.461	.010+		.000#	.004#		.236	.455			
93	1	41.7	142	16.1	57.6	95.5	5.6	43.1		1229	1243		2.3	95.4			
	2	33.5	114	16.6	56.7	83.7	4.4	38.2		1211	1232		2.8	93.6			
	LOCs	3	3	3	3	6	8	19		17	17		6	3			
	REPS	18	18	18	16	21	18	65		29	30		14	16			
	PROB	.206	.177	.448	.009	.210	.149	.006#		.198	.423		.103	.034+			
TOTAL SUM	1	64.4	107	17.1	58.4	97.5	5.3	40.6	99.7	1220	1231	5.7	2.6	95.3	95.2	99.6	
	2	57.5	104	17.9	56.4	92.5	4.7	39.2	99.8	1185	1212	3.7	2.4	95.1	84.9	98.8	
	LOCs	15	15	15	15	16	21	64		60	56	6	11	12	4	3	
	REPS	56	56	56	54	39	42	157		14	85	76	13	25	43	10	5
	DIFF	6.8	13	0.2	2.0	5.0	0.6	1.4	0.2	35	19	2.0	0.3	0.2	10.3	0.8	
	PROB	.015+.018+	.407	.000#	.147	.097+	.079+	.363	.000#	.003#	.048+	.589	.908	.187	.205		

DEFINITIONS

In the description and examples, a number of terms are used herein. In order to provide a clear and consistent understanding of the specification and claims, including the scope to be given to the terms, the following definitions are provided:

BAR PLT = BARREN PLANTS. This is the percent of plants per plot that were not barren (lack ears).

BRT STK = BRITTLE STALKS. This is a measure of the stalk breakage near the time of pollination, and is an indication of whether a hybrid or inbred would snap or break near the time of flowering under severe winds. Data are presented as percentage of plants that did not snap.

BU ACR = YIELD (BUSHELS/ACRE). Actual yield of the grain at harvest adjusted to 15.5% moisture. ABS is in absolute terms and MN is percent of the mean for the experiments in which the hybrid or inbred was grown.

DRP EAR = DROPPED EARS. This is a measure of the number of dropped ears per plot and represents the percentage of plants that did not drop ears prior to harvest.

EAR HT = EAR HEIGHT. The ear height is a measure from the ground to the top developed ear node attachment and is measured in centimeters.

EST CNT = EARLY STAND COUNT. This is a measure of the stand establishment in the spring and represents the number of plants that emerge on a per plot basis for the hybrid or inbred.

GDU SHD = GDU TO SHED. The number of growing degree units (GDUs) or heat units required for an inbred line or hybrid to have approximately 50 percent of the plants shedding pollen and measured from the time of planting. Growing degree units are calculated by the Barger Method, where the heat units for a 24-hour period are:

$$\text{GDU} = \frac{(\text{Max. temp.} + \text{Min. temp.})}{2} - 50$$

The highest maximum temperature used is 86°F and the lowest minimum temperature used is 50°F. For each inbred or hybrid it takes a certain number of GDUs to reach various stages of plant development.

GDU SLK = GDU TO SILK. The number of growing degree units required for an inbred line or hybrid to have approximately 50 percent of the plants with silk emergence from time of planting. Growing degree units are calculated by the Barger Method as given in GDU SHD definition.

GRN APP. = GRAIN APPEARANCE. This is a 1 to 9 rating for the general quality of the shelled grain as it is harvested based on such factors as the color of the harvested grain, any mold on the grain, and any cracked grain. High scores indicate good grain quality and low scores indicate poor grain quality.

MST = HARVEST MOISTURE. The moisture is the actual percentage moisture of the grain at harvest.

PLT HT = PLANT HEIGHT. This is a measure of the height of the plant from the ground to the tip of the tassel in centimeters.

RT LDG = ROOT LODGING. Root lodging is the percentage of plants that do not root lodge; plants that lean from the vertical axis at an approximately 30° angle or greater would be counted as root lodged.

SDG VGR = SEEDLING VIGOR. This is the visual rating (1 to 9) of the amount of vegetative growth after emergence at the seedling stage (approximately five leaves). A higher score indicates better vigor and a low score indicates poorer vigor.

STA GRN = STAY GREEN. Stay green is the measure of plant health near the time of black layer formation (physiological maturity). A high score indicates better late-season plant health.

STK LDG = STALK LODGING. This is the percentage of plants that did not stalk lodge (stalk breakage) as measured by either natural lodging or pushing the stalks and determining the percentage of plants that break below the ear.

TST WT = TEST WEIGHT UNADJUSTED. The measure of weight of the grain in pounds for a given volume (bushel).

4E. EXHIBIT E. Statement of the Basis of Applicant's Ownership

Pioneer Hi-Bred International, Inc., Des Moines, Iowa, is the employer of the plant breeders involved in the development and evaluation of PHTD5. Pioneer Hi-Bred International, Inc. has the sole rights and ownership of PHTD5.